

1964

Annual Report

CALIFORNIA ACADEMY OF SCIENCES



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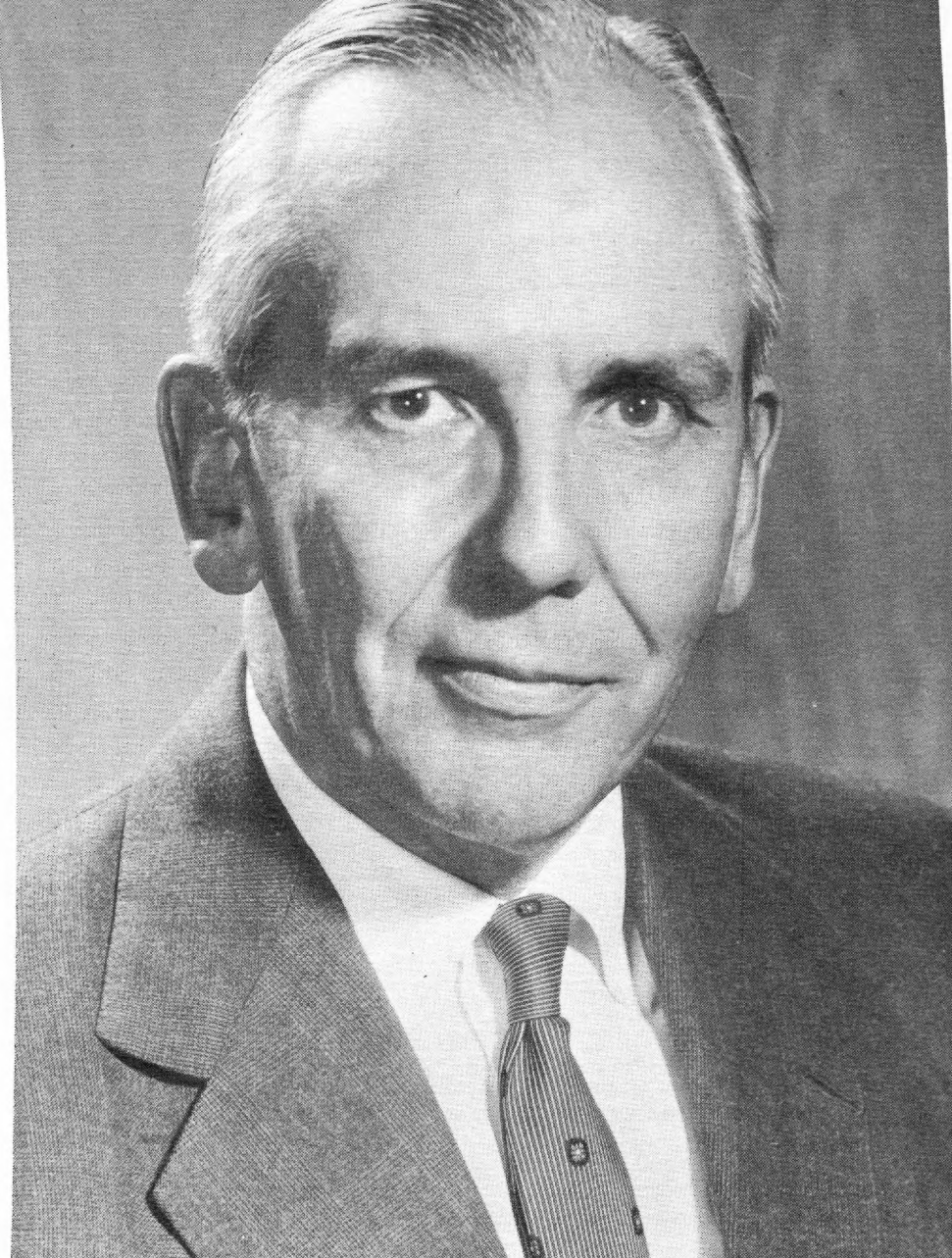
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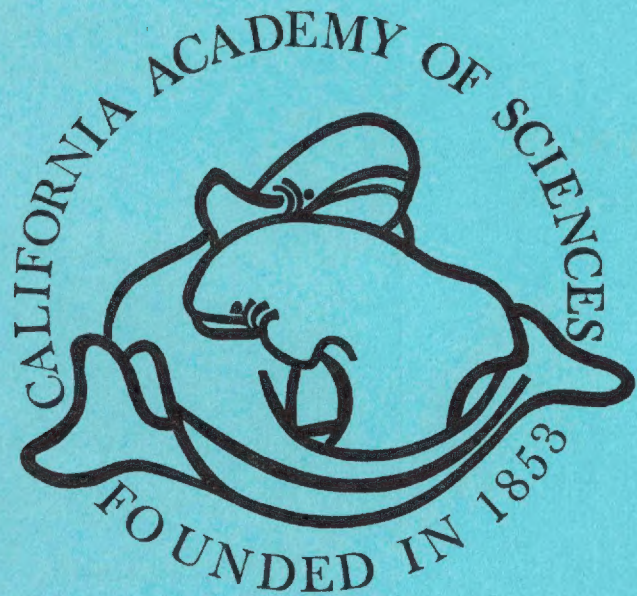


Chairman of the Board Decker G. McAllister

TO THE MEMBERS AND FRIENDS OF THE CALIFORNIA ACADEMY OF SCIENCES

THE 111TH YEAR of the California Academy of Sciences has been another year of progress and consolidation, and this Annual Report contains the first report of our new director, Dr. George Lindsay, who assumed those responsibilities on October 1, 1963. You will find it to be an interesting report of the vigorous activities that are going on.

An attendance record of 3,500,000 visitors has furnished dramatic proof of the eminence of the Academy in that most important measure of an academy's—or a museum's—contribution to its members and to the community. There can be no more important goal than that of public service, and no more important measure of achievement of that goal than the number of people who visit the Academy, and are enriched by their visits.



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Consider for perspective that, based on the latest figures from other institutions, this attendance of 3,500,000

- Places the Academy among the peerage of museums and galleries of the United States—and last year was exceeded only by attendance at the Metropolitan Museum of Art in New York City and the Smithsonian Institution in Washington, D. C.
- Exceeded the 3,000,000 attendance of the American Museum of Natural History in New York and, according to the most recent available information, was over double the attendance of the Palais de Louvre in Paris.
- Exceeded by more than 75% the combined total attendance of the three major art museums in San Francisco—M. H. de Young, California Palace of the Legion of Honor, and the San Francisco Museum of Art.
- And finally, is well over twice the attendance recorded at Candlestick Park during the Giants' 1962 pennant-winning season.

This record—of which the community can well be proud—results from the excellence of the achievements of the Academy Staff and its Directors, which have been made possible by the wholehearted support of the Academy's membership, and the financial backing given by the City Administration and the many public-spirited business organizations, corporations and individual citizens.

There is much still to be done, as the Staff and the Trustees have many carefully developed plans and ideas for even further increasing the Academy's contribution to the cultural life of the community. What has been accomplished has truly been accomplished under a financial austerity program. It is hoped that 1964's dramatic demonstration of the important position that the Academy has achieved in the cultural life of the community—both local and worldwide—will encourage its supporters to continue—and enhance—their support.

During the past year, there have been several changes in the structure of the Board of Trustees. Mr. I. Warren Hellman, Chairman of the Board of Wells

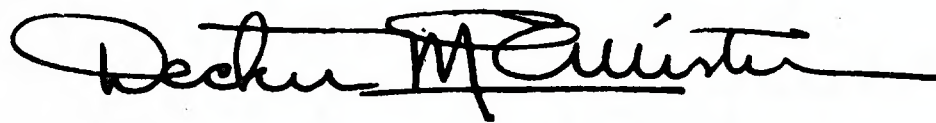
Fargo Bank, was elected a trustee to fill the vacancy created by the resignation of Marco F. Hellman under the pressure of other civic duties. It is with particular regret that I report the death of two trustees, each of whom had in his way rendered exceptional service to the Academy: Brayton Wilbur who had just been elected an honorary trustee following 18 years of particularly helpful service; and Capt. Barrett G. Hindes who was elected a trustee in 1957 and treasurer in 1961. As treasurer, Capt. Hindes contributed of his talent towards the reorganization of the Academy's financial operations and controls.

To succeed Mr. Wilbur, the Board elected Mr. Charles H. Russell, Vice President of Batten, Barton, Durstine and Osborne. Mr. Russell for two years previous to his election had contributed his talents in assisting the Television Committee.

The report would not be complete without acknowledging the fine cooperation received by the Academy from the Mayor of San Francisco, the Board of Supervisors, the Chief Administrative Officer and the many officials within the City and County of San Francisco who have all helped make the Academy an institution of which all San Franciscans can and should be proud.

And finally, may I express our sincere appreciation to the Academy's scientific and supporting staffs as well as to its administration for the fine work they are performing and to the people of San Francisco, business organizations and to the public at large who, through their financial support, make the Academy's work possible and for whom the Academy exists.

Respectfully submitted,



DECKER G. McALLISTER
Chairman, Board of Trustees

REPORT OF THE DIRECTOR

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DURING THE PAST fiscal year, 1963-1964, three and one-half million visitors came to the California Academy of Sciences to enjoy its Steinhart Aquarium, Morrison Planetarium, the science museums, and the J. W. Mailiard, Jr., Library. This attendance, a record for the Academy and one equalled by very few of the great museums of the world, indicates unqualifiedly that the CAS is a major cultural asset not only to San Francisco and the local scientific community, but to the entire state of California and the nation.

At this zenith in Academy activities, it is timely to look back briefly to where it all began, how the Academy came about, and what has transpired during the 111 years that have ensued, resulting in today's popular success and making the Academy the estimable institution which it is.

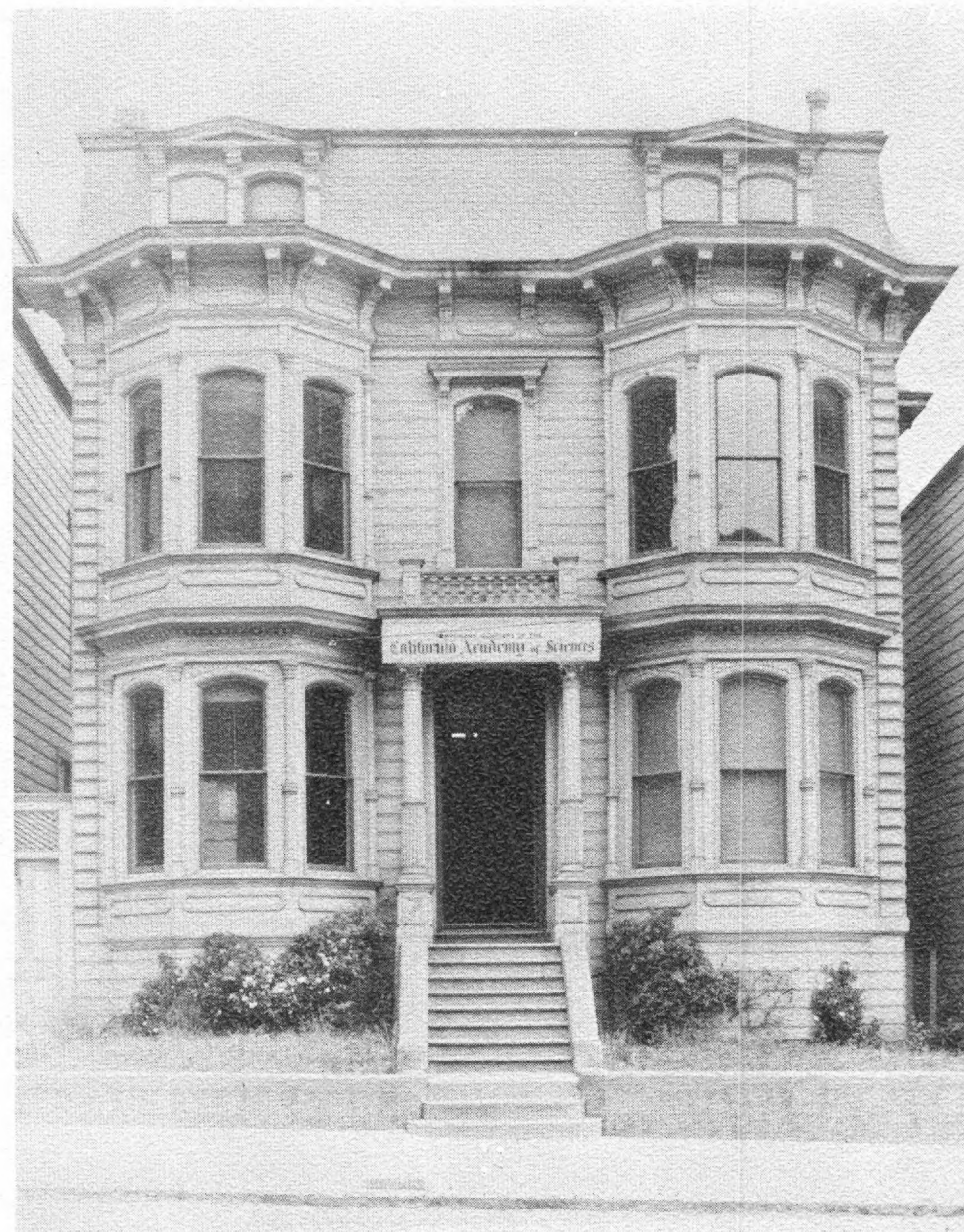
On a spring evening in 1853, seven men met together in an office at 129 Montgomery Street. Their purpose: to found the "California Academy of Natural Sciences," the objective of which was "the investigation and development of . . . science, the collection of a cabinet of specimens and a Library to embrace the standard and current works on Natural History and Natural Science." Almost immediately, a library was started, collections accumulated, and scientific papers published. The original headquarters at 622 Clay Street was the initial museum and science library in the West. This all happened only three years after California became a state.

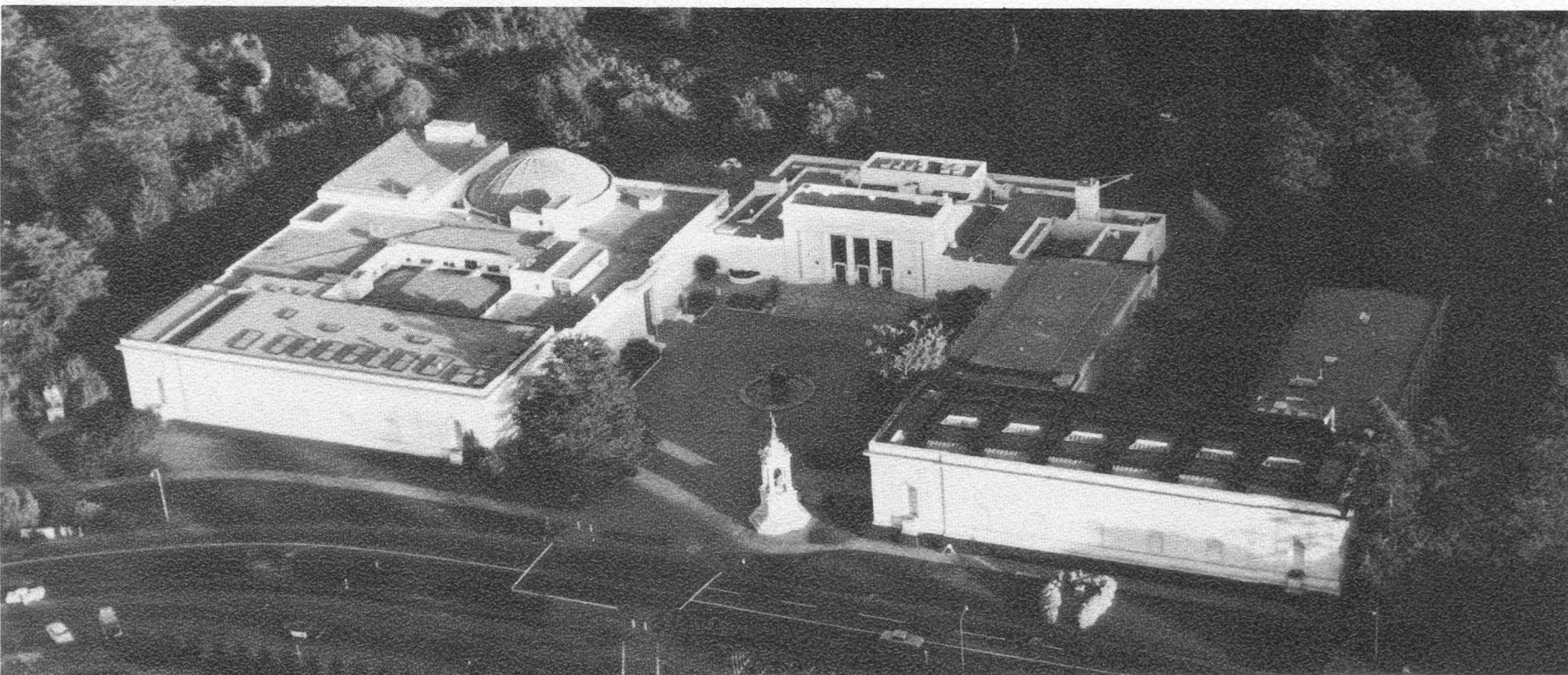
Twenty-one years later, in 1874, with the support of Charles Crocker, Leland Stanford, and others, the Academy established its first formal public museum in a building on Grant Avenue at California Street diagonally across from Old St. Mary's Church. The following year, James Lick gave property on Market Street between Fourth and Fifth and also provided a legacy which made possible the construction of a five-story museum building which was completed in 1891. There, a fascinated public could see a restoration of a mammoth, an elephant skeleton, stuffed animals and birds, Indian and Eskimo artifacts — all the accouterments of a good nineteenth-century museum. With its library, which had grown to thousands of volumes, and its scientific departments and collections supervised by curators, the Academy was a San Francisco showplace and the city's headquarters for scientific activity.

The catastrophic fire which followed the earth-



The Academy then and now. Above, Montgomery Street looking north from California Street, 1854. The Academy was founded in 1853 in an office on the left side of this street. Below, temporary home of the Academy on Gough Street, shortly after the 1906 earthquake. Right, the Academy today, in Golden Gate Park.





quake of April 18, 1906, completely destroyed the new museum, the library, and the irreplaceable scientific collections. Only a wagonload of particularly valuable specimens plus the historical files found its way to safety through the efforts of Alice Eastwood, Curator of Botany, who sacrificed her own possessions while saving those of the Academy.

Though this loss was serious indeed, retrospect would indicate a definite advantage. Had the CAS remained at its Market Street location, the continued expansion which has characterized the Academy would have been impossible. By arrangement with the City, the Academy moved its scene of activity to Golden Gate Park, and in 1916 the first unit of the present complex, North American Hall, came into being. Through a generous bequest from Ignatz Steinhart, the Aquarium opened in 1923. Simson African Hall, with its peerless habitat groups, came about in 1934. The Science Museum and Morrison Planetarium, through further bequests and donations, appeared in 1952. Seven years later, the J. W. Mailliard, Jr., Library and new quarters for the Botany Department were added, and most recently, June 28, 1963, Steinhart Aquarium reopened after a complete renovation made possible by a \$1,575,000 bond issue voted by the people

of San Francisco. (It is interesting to note that the last named figure represents *the only tax funds ever used* in the construction of the present \$5,000,000 complex of Academy buildings — all of which have been given to and are the property of the City and County of San Francisco.)

It has often been conjectured what Leonardo da Vinci's reaction would be were he brought to life and set down in New York's Times Square. By the same token, what would the seven original founders feel if they could see the Academy as it is now, walk through the many buildings, be part of the teeming crowds, witness the exhibits, examine the burgeoning scientific collections, and peruse the hundreds upon hundreds of technical publications?

One phrase, probably, would do for them all: "It would seem we had a pretty good idea!"

BUILDING IMPROVEMENTS

There were significant building improvements during the year. The roof of much of the North American wing was reconstructed, in fact an entirely separate

and new roof was built over the Bird Hall. The same will be done over the North American Mammal Hall during 1964-65. These are essential first steps in the renovation of those areas, the oldest in our present museum. This maintenance was paid for by the City and County of San Francisco.

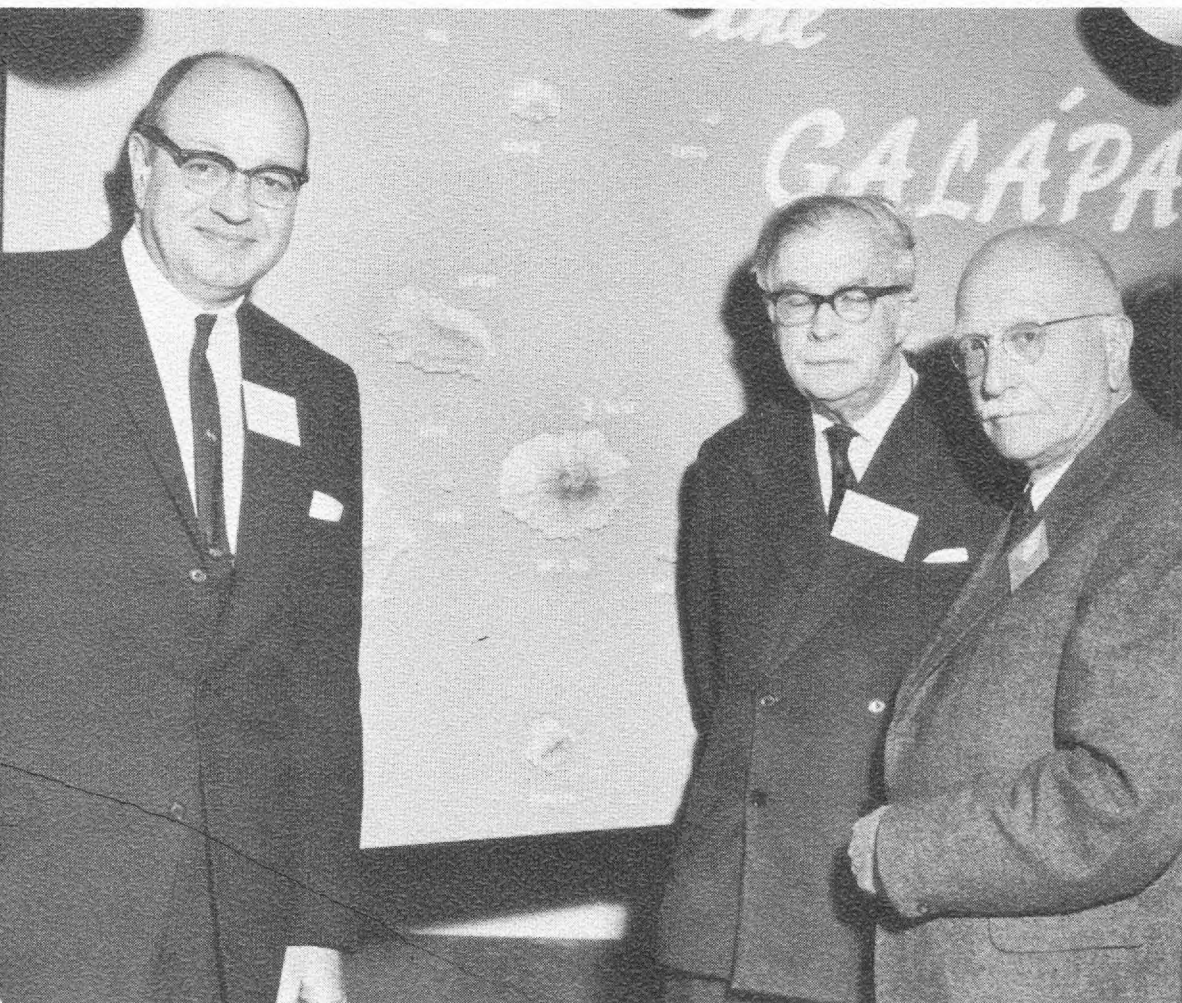
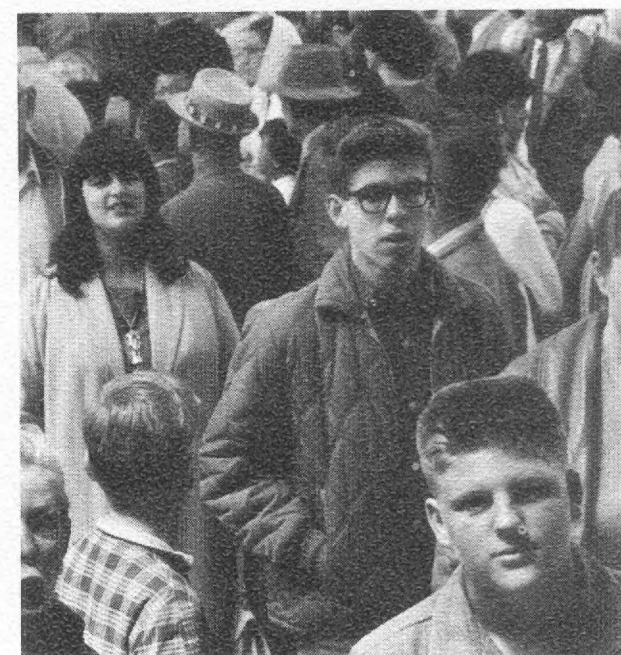
The new roof made possible the development of a Hall of Prehistoric Life which was opened on June 28, 1964. This serves a dual purpose, that of an exhibit hall and of an auxiliary restaurant, and it also makes possible a much-needed traffic flow between North American Hall and the Aquarium. A lowered, suspended ceiling, new lighting, a new floor, and exhibit cases were furnished by the Academy.

The Planetarium, which had been in continuous operation since its opening in 1952, was closed from December 2 to December 21, 1963, for major maintenance. The dome was repainted to increase the brilliance of star images, and the 458 upholstered seats were equipped with foam rubber head rests. The sound system was improved with two new recorders and new speaker cones.

The "Fountain of Whales" in the courtyard was equipped with new fountain heads, a circulating system and pumps, and supply and drain lines, largely



Left, Academy Director George E. Lindsay, Sir Julian Huxley, and the late Victor Van Straelen touring the Academy before leaving on the Galapagos expedition. Above and right, ever since Steinhart Aquarium reopened in 1963, crowds of visitors have come every day to see the renovated aquarium and, more recently, the new alligator swamp and reptile room.



through the generosity of the family of a trustee. Electronic controls connected to an anemometer reduce the fountain spray during windy periods.

SPECIAL EVENTS

From the time of Steinhart Aquarium's reopening on June 28, 1963, the Academy drew not only a record-breaking number of visitors (one-half million in the first 26 days!) but also played host to various groups which included distinguished figures from across the United States and around the world.

With other local museums, the Academy greeted members of the 21st Annual Meeting of the Western Museums Conference, October 11-13, and the following day the American Fisheries Society convened at the Academy, the first such meeting held in the Bay Area.

December 10, officially proclaimed "Nobel Day" by the Mayor of San Francisco, found the Academy the setting for an exhibit and a program and reception sponsored by the local Swedish Consulate honoring

Right, a model from "Technology Now," an exhibit presented at the Academy during Swedish Week, being viewed by Sigvard Strandh, Director of the Technical Museum in Stockholm, Academy Director George E. Lindsay, and H. R. H. Prince Bertil of Sweden.



seven Nobel Prize Winners. At the close of the program, Mr. Per Anger, Consul General of Sweden for San Francisco, awarded the Berzelius Medal to the Academy.

Over three hundred specially selected high school students attended the second series of Holiday Science Lectures arranged by the Academy and the American Association for the Advancement of Science on December 30 and 31. Dr. Kenneth D. Roeder, an eminent biologist from Tufts University, presented the series, which was subsidized by the National Science Foundation.

January 8, 1964, saw 60 distinguished scientists from all parts of the globe assembled at the Academy as a preliminary to the Galapagos International Scientific Project. Included in this noteworthy company were Sir Julian Huxley, famous British biologist and author, and the late Victor Van Straelen, who was then President of the Charles Darwin Foundation for the Galapagos Islands and Honorary Director of the Royal Institute of Natural Sciences of Belgium.

His Royal Highness, Prince Bertil of Sweden,

officially opened an exhibit, "Technology Now," at the Academy on February 24, a part of San Francisco's celebration of Sweden Week.

Over 300 prize-winning exhibits created by young science students were on display in early April in connection with the 11th San Francisco Bay Area Science Fair, an annual event held at the Academy.

On May 21, the Special Libraries Association held its meeting in the J. W. Mailliard, Jr., Library.

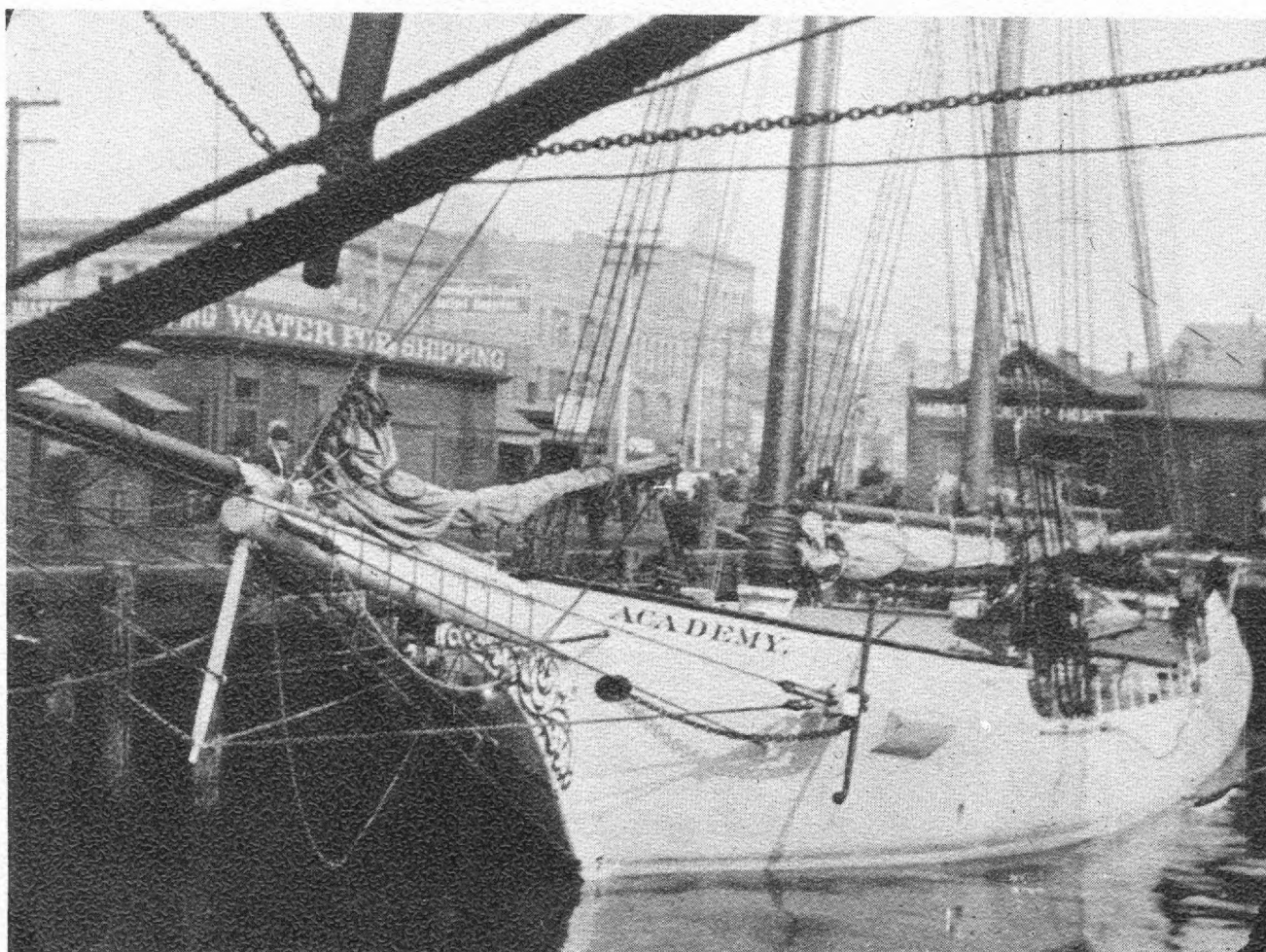
It is more and more evident, as time passes, that the Academy is meriting an ever-widening reputation, national and international.

RESEARCH DEPARTMENTS AND ACTIVITIES

The prestige enjoyed by the Academy stems largely from the activities of its research departments. A principal duty of an institution such as ours is to explore actively the world in which we live and to

accumulate scientific collections of the material discovered. These collections are essential to those who classify and inventory nature, and are the archives for the preservation of the evidence concerning classification. They are also the nuclei in the search for new facts as systems of classification are improved, as well as repositories of essential materials for the investigation of evolution, speciation, biogeography, ecology, and other disciplines. Recognizing this, the Academy is becoming more and more the safe-keeper of collections assembled in the local universities.

Knowledge is never useless. In fact, much systematized information resulting from Academy research performed with no thought of economic application has become the basis for applied science. For example, microscopic fossil diatoms which have for many years engaged the attention of Dr. G Dallas Hanna have been found to be important as index fossils for the identification of geologic formations in petroleum exploration. The three and one-half million labeled insects in the entomology collections are a unique asset to those who study the plant pests plaguing the agricultural industry. The resources of the bird and mammal collections are used by those in medicine



Left, the schooner, ACADEMY, used for the 1905 Galapagos expedition. Above, Research Associate Francis X. Williams, who went on the 1905 expedition, and Dr. Robert L. Usinger, Director of the Galapagos International Scientific Project, examining a live Galapagos land iguana from Steinhart Aquarium before leaving for the Islands. Right, Entomology Field Assistant David Cavagnaro unloading an insect collecting bottle on the Galapagos. Far right, Senior Scientist Robert C. Miller and Curator of Ornithology and Mammalogy Robert T. Orr searching for flamingos on Santa Cruz Island.

who are concerned with the animal vectors of disease. Collecting specimens and making field observations, then analyzing the taxonomy, morphology, ecology, biogeography, and other aspects of the problem at hand, and the publication of the results of the investigation, are typical research projects of the Academy.

FIELD TRIPS AND EXPEDITIONS

The Academy's tradition of field exploration and research continued. This year's explorations spread from Alaska to Argentina in the Western Hemisphere, with some work in Saudi Arabia and other areas of the old world.

During January and February, 1964, six staff members and two Trustees participated in the Galapagos International Scientific Project. This was organized by the University of California Extension with support from the National Science Foundation, the California Maritime Academy, and the United States Navy. A grant of \$15,000 to the Academy by the Bel-

vedere Scientific Fund made our full participation possible. Of that grant \$5,700 was used for direct expenses of Academy personnel and \$9,300 was transferred to the University for general expedition support. The activities of Academy personnel on this expedition will be mentioned in the appropriate department reviews.

Edward S. Ross, Curator of Entomology, and his son Clark, made a flying trip to South America to secure living cultures of Neotropical Embioptera in March, April, and May. In addition to the cultures, a comprehensive collection of insects and hundreds of photographs were made. The project was supported by the National Science Foundation and the National Geographic Society.

Lillian J. Dempster, Associate Curator of Ichthyology, obtained fishes from Lake Maracaibo, Venezuela, in October and November, 1963.

Curator of Geology G Dallas Hanna joined an Alaskan party of the U. S. Geological Survey in May, 1964, to investigate the displacement of land masses resulting from the earthquake of March 27.

Mexico has long held the interest of our biologists. Research Associate in Ornithology J. Dan Webster





Left, Dana Fuller photographing David Powell and a pufferfish on the Baja California expedition. Two "Science in Action" programs and a documentary film about Academy expeditions, "The Sea of Cortez," were filmed on location during this expedition. Below, skindiving scientists preparing to collect undersea specimens in the Gulf of California. Right, these Monterey cypresses were among many kinds of plants visited and studied in the field by Curator of Botany John Thomas Howell and Field Associate Beatrice F. Howitt during the preparation of their book, "The Vascular Plants of Monterey County, California."

collected birds and mammals in central Mexico, with support from the American Museum of Natural History Chapman Fund. He also received an AAAS-Academy grant which enabled him to take one of his students, Gwilym Jones, as assistant. Dr. Webster's son, Jack, collected 300 specimens of reptiles and amphibians for the Academy.

The American Museum's Sanford Trust Fund continued support of the Mexican field work of J. Stuart Rowley, Research Associate in Ornithology, who went into a previously unexplored area in southwestern Oaxaca on a preliminary survey. More extensive studies are planned for this region in the coming year.

Allen Greer, Field Assistant in Herpetology and a graduate student at Harvard University, continued his investigation of the reptiles and amphibians of Nayarit, Mexico, with the help of an AAAS-Academy grant. His extensive collections will be deposited at the Academy and used in his doctoral research project.

Between June 20 and July 4, 1964, the Academy conducted an expedition to the islands in the Gulf of California between Loreto and La Paz, Baja California. Richard M. Adcock of La Paz made special arrange-





ments for use of his houseboat, the "Marisla," and the Belvedere Scientific Fund provided \$3,000, and Roy E. Marquardt \$2,000 for the trip. Eleven biologists participated: Ira L. Wiggins of Stanford University and the Belvedere Scientific Fund, and an Academy Trustee; Alejandro Villalobos Figueroa of the Instituto de Biología of Mexico; George Lindsay, Robert T. Orr, Earl S. Herald, David Powell, Dustin Chivers, and Raymond Bandar of the Academy; Allan J. Sloan, Richard C. Banks, and Chris Parrish of the San Diego Natural History Museum; and two teen-age collectors, Bruce Marquardt and Francisco Muñoz Jr. David Parker, television director for "Science in Action," Dana L. Fuller, cameraman, and George Tsegeletos, diver and underwater cinematographer, made a motion picture record of the expedition.

In addition to foreign work, much field investigation was carried out in the United States and Canada. For example, Edward L. Kessel, Associate Curator of Entomology, traveled 25,000 miles in twelve states and three provinces of western Canada to obtain material for his monograph of the Platypezidae (flat-footed flies) of western North America, and W. I. Follett, Curator of Fishes, conducted or participated in 27

field trips, all in California or Arizona. Robert T. Orr, Curator of Ornithology and Mammalogy, spent 17 days on Año Nuevo Island in connection with his research in population changes and behavior of marine mammals. Walter Schneebeil, Collector for the Aquarium, made 78 collecting trips for live specimens, some of which were to southern California and Arizona. In addition, he picked up foreign shipments from various ships on 14 occasions.

RESEARCH DEPARTMENTS

Eight Academy departments are primarily concerned with research and the care of the research collections. Others, such as the Aquarium, are involved with certain research projects. Still others edit and publish results of research. In all, 67 of our total staff of 155 employees and Research Associates are involved in these activities.

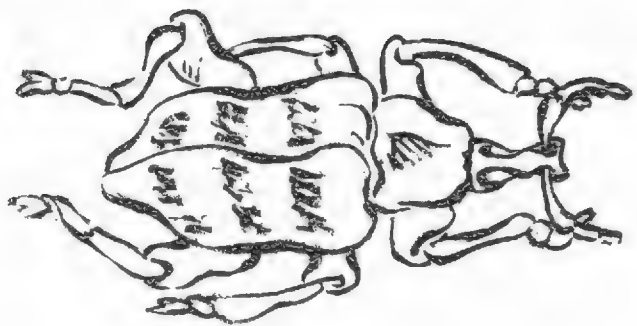
BOTANY

John Thomas Howell, Curator. The Herbarium contained 445,629 mounted specimens on June 30, 1964, an increase of 6160 for the year. In addition 1702 specimens of the Prager Herbarium were remounted and filed in the general herbarium. Accessions during the year totaled 10,196: 6498 by gift, 1292 by exchange, and 2406 from staff collections.

Curator Howell spent much of the year preparing, editing and reading proof of a 184-page flora of Monterey County which he and Beatrice F. Howitt published in *The Wasmann Journal of Biology*. Mr. Howell also edited and published three issues of *Leaflets of Western Botany*.

Elizabeth McClintock, Associate Curator, made a six weeks trip to eastern herbaria in connection with her revisionary study of the genus *Spiraea* in North America. She is also reviewing a number of plant families under a grant from the National Science Foundation and Cornell University, in preparation for the publication of *Hortus III*. Dr. McClintock continues work on a flora of San Bruno Mountain, with the cooperation of Mr. and Mrs. Walter Knight of Petaluma.

The Academy's Botany Department is a center



for the study of plants cultivated in California and is also an important center for regional studies of California's flora. The following may be noted as projects being pursued with the Academy as base: Peter Rubtzoff on Sonoma County fresh-water marshes; Ernest Twisselmann on the flora of Kern County; Clare B. Hardham on the flora of the Santa Lucia Range; Henry M. Pollard on the Santa Barbara area and the flora of the Ventura River Basin; Walter and Irja Knight on Sonoma County; and Gordon H. True on Nevada County. These regional systematic studies are most important.

Volunteer help has been most important in the Botany Department. Research Associate Lewis S. Rose continued to give much of his time to curatorial and bibliographic work, as well as to field work and specimen exchange. Marjorie Hart was engaged in repackaging specimens of mosses during the year, the total now reaching 8071 specimens. Leona Fick, Edna Kelsey, Lilly Kruse, Helen La Plant, and Peter Rubtzoff are among others who have given generously of their time.

The California Botanical Club, now in its 74th year, held meetings each month under the leadership of Mr. Howell. The Botany Department Endowment Fund which the club initiated in 1955 now totals \$51,285, including the Olive MacFarland fund of \$5,000



Left, life in the Academy's burgeoning Entomology Department, filled almost to overflowing with cases of insects. Associate Curator Hugh Leech is examining a tray of specimens, and Assistant Curator C. Don MacNeill is at his desk, working on curatorial tasks. Above, Curator of Entomology Edward L. Ross photographing insects on the trunk of a tree in the jungle along the Amazon.

which was received in the spring of 1963 and the William and Alice Herrin bequest of \$36,300 which was received in early 1964.

ENTOMOLOGY

Edward S. Ross, Curator. The Entomology Department collections contain 3,127,068 fully prepared specimens, of which 8803 are particularly significant type specimens on which new species were based. It is the foremost insect type collection depository in western North America. During this report period, 187,931 specimens were accessioned. Of these, 27,391 came as gifts; 109,447 from Academy staff collecting; 19,092 non-staff collected during Academy-financed expeditions; 31,404 purchased; 383 through exchanges;



107 by permanent loan deposit; and also 107 by indefinite loan deposit. With the preparation of the large amount of material recently acquired in tropical regions, the Department soon will have accessioned almost five million specimens.

Thanks to three National Science Foundation projects, the Department reached an all-time peak of activity during the year. About 1000 visitors, many from foreign countries, used its facilities. Loans to other institutions totaled 66,789 specimens in 194 separate transactions.

Dr. Ross continued his research on Embioptera under a National Science Foundation grant activated on January 1, 1963. A supplementary, two-year NSF grant, begun February 1, 1964, permitted the continuance of Indo-Australian Embioptera cultures for cytological investigation, and supported the previously mentioned three-month field trip to representative life zones of South America. About 200 cultures of Embioptera, representing the major Neotropical categories as well as many new species, were collected. This survey was augmented by about 20 important cultures collected by David Cavagnaro in the Santa Elena region and highlands of Ecuador.

Edward L. Kessel, Associate Curator, continued field work for his monograph on Platypzidae of western North America. At the Academy, he devoted his full time as editor of CAS scientific publications.

Hugh B. Leech, Associate Curator, served as chairman of the department during Dr. Ross' absence, curated beetles (under terms of an NSF facilities grant), and handled loans and return of exchanged material. Assistant Curator C. Don MacNeill, employed throughout the year with funds from the NSF, relieved Dr. Ross of certain curatorial and administrative duties, attended to departmental grant purchasing, and curated Lepidoptera. Paul H. Arnaud, Jr., prior to and after his appointment to regular staff status on January 1, performed general curating in the orders Diptera, Hemiptera, Hymenoptera, Thysanoptera, among others.

John W. Green, Scientific Assistant, spent his time mounting insects and assisting Mr. Leech with curating or the preparation of loans.

With a portion of a special grant from the Belvedere Scientific Fund, two entomologists representing the Academy were added to the party of the Galapagos International Scientific Project: David Cavagnaro and

Robert O. Schuster, both of the University of California at Davis. Mr. Schuster specialized in insects and related arthropods of subterranean and other habitats. The two young men were equipped with special devices, including flight traps, black lights, and berlese funnels and were able to make the largest and most comprehensive collection of Galapagos insects extant. Most of their work was done on Santa Cruz Island but short trips were made to several other islands, some by helicopter permitting Cavagnaro to visit areas heretofore unseen by man. Schuster returned with the bulk of the collections in February and Cavagnaro remained until the end of July. It is estimated that more than 50,000 specimens in all groups were taken.

GEOLOGY

G Dallas Hanna, Curator. The Department of Geology is responsible for the research collection of fossils, rocks, minerals, and Recent shells. During the past year, 234 lots of specimens were catalogued and placed in the general collections, and 35 specimens were added to the type collections. There are now 12,610 holotypes, paratypes, hypotypes, and casts of types in that series.

Dr. Hanna completed a paper on the introduced mollusks of the western United States. As mentioned earlier, he investigated the displacement of the strand line in Alaska resulting from the March 1964 earthquake. This was done in company with a party from the U. S. Geological Survey. He also continues his work on fossil diatoms from Santa Cruz, San Clemente, and Catalina Islands.

Leo G. Hertlein, Curator of Invertebrate Paleontology, continued work on a monograph of the fauna of the San Diego formation. He also prepared a report, in collaboration with William K. Emerson of the American Museum of Natural History, of fossil invertebrates collected on the Belvedere Expedition to the Gulf of California in 1962. Dr. Hertlein had charge of the type collection and the curating of the general collection.

Charles Chesterman, Research Associate and Honorary Curator of Minerals, continued to care for the mineral collection. Barbara Chesterman was employed as a part-time cataloguer.

Alan J. Galloway, Research Associate, continued field work in connection with his comprehensive study of the geology of the Point Reyes peninsula. A student volunteer, Mr. Michael Lampen, assisted Mr. Galloway during the summer months.

Research Associate Clifford C. Church is studying Foraminifera of Cretaceous age, and served as consultant in geology for the public school system of Bakersfield, California.

The Geology Department is involved in the publication program of the Academy. Work connected with the MacFarland manuscript on nudibranchiate mollusks demanded much time. That publication is nearing completion. Winifred O'Neil was employed beginning November 1, 1963, to aid with the large amount of editing, checking, and proof-reading. Most of the text, the plates, and the explanation of the

plates are now in galley proof. Dr. and Mrs. Hanna continued the printing of color plates with the Eastman process for several Academy publications, and Dorothy Ludlow varityped numerous manuscripts.

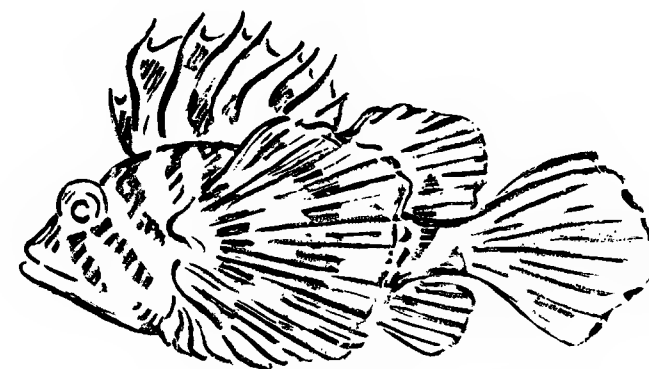
HERPETOLOGY

Alan E. Leviton, Curator. Reptile and amphibian collections include about 110,000 specimens, of which 94,900 have been catalogued. During the year 1400 specimens were acquired through gifts and exchanges.

In August 1963 Benjamin Banta terminated his temporary position as Research Herpetologist to accept a position with Colorado College. Dr. Leviton returned from a year's leave of absence at Stanford



Curator of Geology G. Dallas Hanna went on two expeditions to Prince William Sound with the U. S. Geological Survey to study the effects of the 1964 Alaskan earthquake. He is here measuring the rise in the land around the Sound. This information had ecological as well as geological value, as the change in the level of the land destroyed much of the littoral zone around the Sound for years to come.



University, and was appointed Curator of the department. Steven C. Anderson, a Ph.D. candidate at Stanford University, was hired as Research Assistant, and received a probationary appointment as Assistant Curator, to be effective July 1, 1964. Dr. Banta, Research Associate, has received Academy grants to collect specimens in the Rocky Mountain region. Allen Greer, a graduate student at Harvard University, was appointed Field Assistant for 1964 and awarded an AAAS-Academy grant to help finance collecting activities in Nayarit, Mexico. Charlotte Dorsey served as departmental secretary.

Following the completion of several manuscripts on Philippine snakes now in press, Dr. Leviton was invited to prepare a chapter on "Venomous Snakes of Asia" to be included in the Academic Press book *Venomous Animals and Their Venoms*. A paper on the electrophoretic characteristics of rattlesnake venoms was prepared for a Ronald Press volume on biochemical systematics. A blood serum study on salamanders, and one on sharks (done jointly with Earl S. Herald), were also in progress.

Research Assistant Anderson continues his studies on the reptiles of southwest Asia and, with the Curator and Field Associate John Gasparetti, is preparing a handbook on the herpetology of Saudi Arabia.

Malcolm Miller, Research Associate, utilized Academy facilities and specimens in connection with his studies of the morphology of the inner ear of reptiles.

ICHTHYOLOGY

W. I. Follett, Curator. The fish collections comprise approximately one million specimens, including some 5200 which were accessioned this year. Outstanding among these were a bigeye thresher shark, *Alopias superciliosus*, presented by John E. Fitch and Phil M. Roedel and representing the first record of this species from California; the holotype and paratypes of the Mexican golden trout, *Salmo chrysogaster*, described by Paul R. Needham and Richard Gard, and of cutthroat trout; paratypes of the lanternfish *Parvilux ingens*, recently described by Carl L. Hubbs and Robert L. Wisner; a specimen of the zebraperch, *Hermosilla azurea*, collected by Frank Spenger at

Tomales Bay and representing a remarkable northward extension of recorded range; the holotype and paratypes of a new species of rockfish, *Sebastes phillipsi*, described by John E. Fitch; a specimen of the skilfish, *Erilepis zonifer*, presented by Julius B. Phillips and representing the second record of this species from California; a specimen of the Burmese freshwater pipefish, *Indostoma paradoxus*, presented by Earl S. Herald; and specimens of an undescribed species of prickleback, *Ernogrammus*, collected by David Powell.

Specimens have been lent, or identified, and taxonomic, nomenclatural, or faunal information provided to 76 individuals or agencies during the year.

The Curator conducted or participated in 27 field trips in California and Arizona. Lillian J. Dempster, Associate Curator, studied and obtained fishes at Lake Maracaibo, Venezuela. Dr. Hubbs, mentioned previously and a Research Associate, is currently engaged, with the Curator, in preparing a manuscript list of the fishes of California. Mr. John D. Hopkirk and Mr. Robert Lea, graduate students at the University of California, and Mr. Serge Rubtsoff worked as part-time assistants.

INVERTEBRATE ZOOLOGY

Robert C. Miller, Curator. On July 1, 1960, the Invertebrate Zoology Department, which had been without a curator for some years, was reactivated. Robert C. Miller, then Director of the Academy, was appointed Curator and Allyn G. Smith, Research Malacologist in the Geology Department, was appointed Associate Curator. Their assigned job was to organize the collection, formerly divided between Steinhart Aquarium and the Geology Department, and to arrange it systematically in order to make it available for research. The collection was assembled in the North American wing.

On September 1, 1963, the Academy was given a two-year grant of nearly \$30,000 by the National Science Foundation, to be used to organize the large collection of preserved invertebrates. Charles R. Stasek was employed as Research Biologist and Dustin Chivers as Technical Assistant, and progress on the rehabilitation was greatly accelerated. The entire preserved collection has been reorganized and a directory

Dr. Orr is measuring the tusks of a walrus with a pair of dividers. This specimen, taken off the coast of Greenland, was one of the first donated to the Academy after the 1906 earthquake and fire destroyed most of the collections.



to the collection prepared. A special type collection, with provisions for the proper storage of preserved whole specimens, microscopical preparations, and for specimens which are preserved dry, was established.

A large and scientifically valuable collection of preserved invertebrates was given to the Academy by Stanford University on indefinite loan. This collection is estimated to weigh about ten tons, and has been found to contain a number of lost or neglected holotypes and paratypes.

Dr. Miller and Mr. Smith participated in the Galapagos International Scientific Project and made extensive collections. Dr. Miller concentrated on wood-boring mollusks and arthropods and found at least three species of shipworms representing two genera in the Teredinidae, and one species of the isopod genus *Limnoria*, none of which had been reported from the archipelago. Mr. Smith made an extensive collection of land snails, which were found to supplement rather than duplicate those collected on the Academy Galapagos expedition of 1905-6, and also brought back a sizable collection of preserved invertebrates, particularly mollusks.

Technical Assistant Chivers was a member of the Academy Sea of Cortez Expedition in June and early

July 1964, and obtained a fine series of marine invertebrates, especially echinoderms and coelenterates.

ORNITHOLOGY AND MAMMALOLOGY

Robert T. Orr, Curator. The collections in this department include approximately 85,000 bird skins, 18,000 mammal skins, and some 20,000 sets of eggs. The collections are richest in materials from the Galapagos Islands, California, British Columbia, Mexico, Panama, Manchuria, and East Africa. Groups best represented are members of the orders Procellariiformes, Anseriformes, and Charadriiformes among birds, and marine mammals and bats among mammals. A total of approximately 17,496 specimens, consisting of 12,118 birds, 4,727 mammals, 65 sets of eggs, and one nest were acquired during the year. The largest single accession was the receipt of approximately 12,000 birds and about 4,500 mammals from Stanford University.

A collection of 151 mammals and 93 birds collected in the plateau region of central Mexico was obtained by Research Associate J. Dan Webster. Dr.

Webster's work was supported largely by the American Museum of Natural History Chapman Fund.

The American Museum's Sanford Trust Fund also continued to support the field work of Research Associate J. Stuart Rowley in Mexico. Mr. Rowley, in accordance with plans made by him and Curator Robert T. Orr, went into a previously unexplored area in southwestern Oaxaca on a preliminary investigation. One of the results was the discovery of a new species of hummingbird of the genus *Eupherusa* which he and the Curator have since described. Additional work in that area is planned for the coming year.

Dr. Orr continued his research on population changes and behavior of the marine mammals of Año Nuevo Island in cooperation with Dr. Thomas C. Poulter of Stanford Research Institute. In addition Dr. Orr supervised the research of six of his students from the University of San Francisco on selected problems. These related to the anatomy of the forelimb and salivary glands of the elephant seal, cranial aging and tooth growth in both the Steller and California sea lion, and the musculature of the hind limbs of swifts.

As an organizer and participant in the Galapagos International Scientific Project, he was able, in January and February, to make behavioral studies on the endemic population of sea lions in the Galapagos Islands. A new bat was discovered in the archipelago and studies were made of other native mammals.

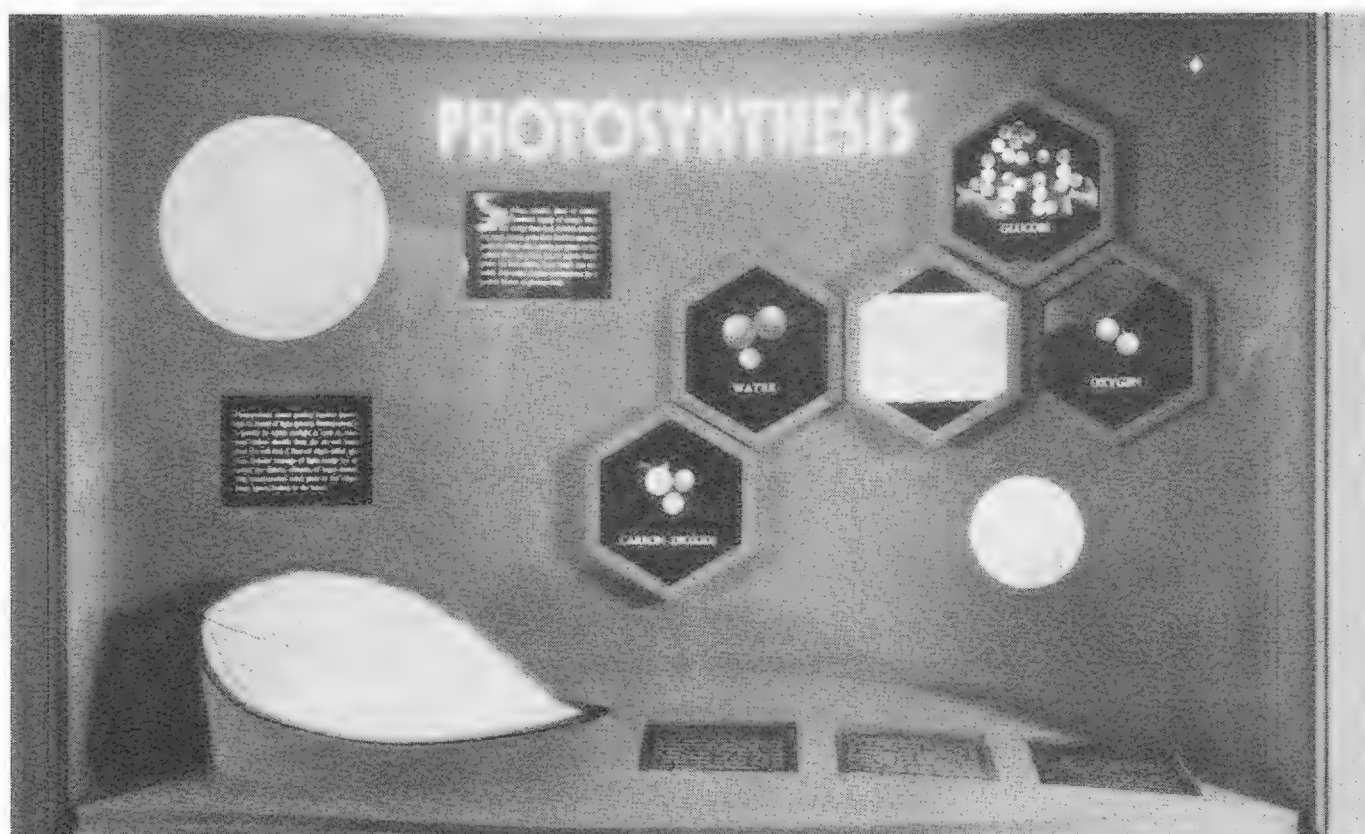
The opportunity to observe another population of sea lions was afforded Dr. Orr by the Academy expedition to the Gulf of California in June. Raymond Bandar accompanied that party as bird and mammal preparator.

Jacqueline Schonewald, Department Assistant, carried out both routine and unusual duties involved in the caring for a scientific collection. She prepared or supervised the preparation of specimens ranging from mice to an elephant, answered telephone and written inquiries about birds and mammals, and continued her studies on the seasonal changes in the population of the sea lions on Seal Rocks in San Francisco.

EDUCATIONAL SERVICES

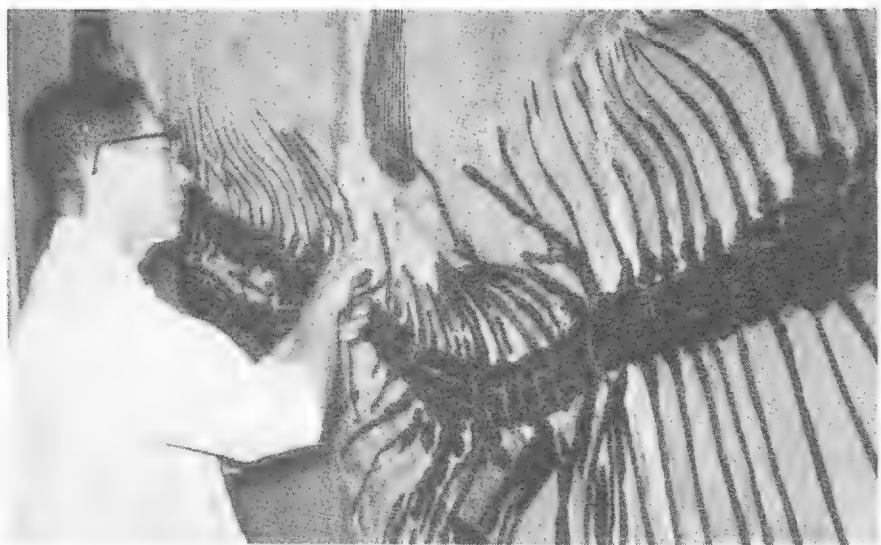
EXHIBITS

Mearl F. Carson, Curator. A museum is judged by its exhibits, which must both entertain and educate. In the unnatural environment of a modern city the museum offers pleasure, satisfaction, and diversity to its visitors of all ages. The Academy is unique in having the living things of the Aquarium as well as the dioramas and other displays of the science halls. There are only five regular employees in the Department of Exhibits and they have had a very busy year.



A major exhibit installed this year is the photosynthesis display. The pictorial and verbal display elements are coordinated so that each unit of the display lights up at the same time as the paragraph describing it. Color and motion are used to simulate the steps by which chlorophyll uses the energy of sunlight to transform elements from air and water into glucose, first splitting the water to extract the hydrogen and release the oxygen, and then combining the hydrogen with the carbon and oxygen of carbon dioxide to produce glucose and then the other carbohydrates, fats, and proteins it needs. The term "photosynthesis" means "to put together by means of light."

The Hall of Prehistoric Life was opened this year, using space formerly devoted to an auditorium. The Exhibits Department has already installed several displays, and is creating others to be installed upon completion. Right, Exhibits Assistant Timothy J. O'Leary drawing the flying lizard, pteranodon, who had a 25-foot wingspread, here portrayed in a mural of extinct animals. Below, the major exhibit in this hall, here being installed by Associate Curator of Exhibits Toshio Asaeda, is the 17-foot fossil of *Portheus mollosus*, who lived 80 million years ago in what is now Kansas. Living relatives of *Portheus* include the tarpon and herring. This fossil was given to the Academy by the San Diego Society of Natural History.



Exhibits Assistant Sheila K. Burden is working on a model of a brontosaurus, one of six dinosaur sculptures she is creating for display in the Hall of Prehistoric Life. Below, after twenty years of use as storage space, the back half of North American Hall is again open to the public. Workers are tearing down the partition that concealed eleven dioramas.



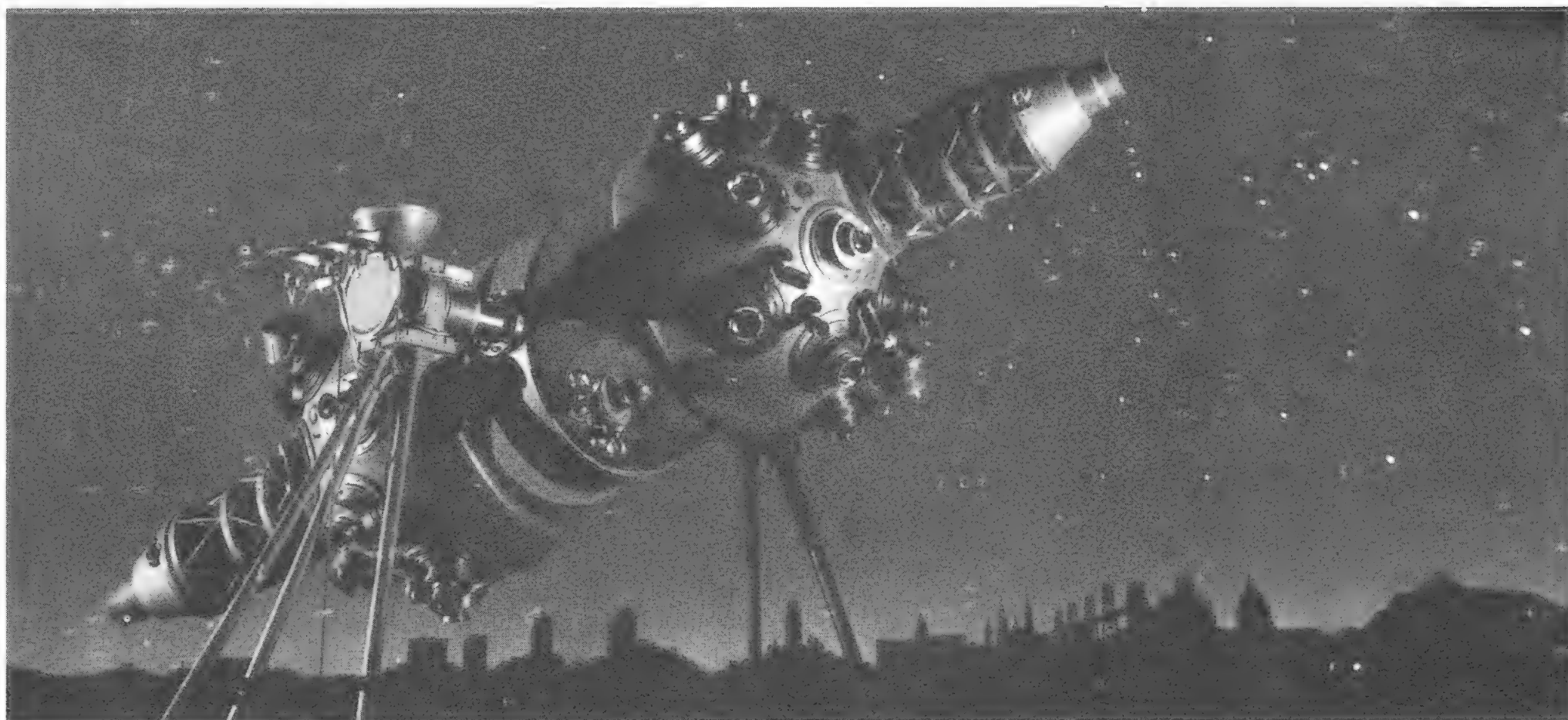
Hundreds of labels for the renovated Aquarium were prepared, each with a painting of a fish or other aquatic organism, and hand-lettered informational text. The art work necessary for special effects of the Planetarium shows was supplied, as were posters and the art work for program schedules, by staff artists. They also prepared seven permanent and forty-four temporary exhibits for the science museums.

"Photosynthesis," a new animated exhibit, is in the Alice Eastwood Hall of Botany. It illustrates the vital chemical and physical process of food manufacture carried on by green plants. "Our Sun" is a new exhibit telling of the size, source of energy, structure, and composition of the sun. It is displayed next to the heliostat in the Hall of Astronomy.

The old auditorium area in North American Hall became the Hall of Prehistoric Life. It underwent extensive renovation including a new floor, a lowered suspended ceiling, rewiring, and new lights. The area is shared by a new buffet and a fossil exhibit, for which nine large display cases were constructed. The most impressive fossil shown is a 17-foot specimen of a giant herringlike fish, *Portheus molossus*, which is 80 million years old and came from the Niobrara formation in Kansas. This specimen was given by the San Diego Natural History Museum years ago and only now could it be shown. Other exhibits are a series of beautiful fish skeletons from the Green River formation of Wyoming, a display featuring dinosaurs, and a thirty-foot mural depicting the evolving life of the past.

Four temporary exhibits were featured in the Lovell White Hall of Man and Nature: "Asian Album," a color photographic record of Edward S. Ross' expedition through tropical Asia; "The Northern Sea Otter," black and white photographic studies and text by Karl W. Kenyon of the U.S. Fish and Wildlife Service; "Tahoe Wild Flowers," delicate watercolor renderings by Caroline R. Chickering; and "Life Beneath the Sea," remarkable underwater color photographs taken off the Channel Islands and around Monterey Bay by Nate Lawrence and Helmut Stellrecht.

Three temporary exhibits were added to the Hall of Astronomy: a 1/10th scale model of a 20-inch refracting telescope loaned by the Tinsley Laboratories; a remarkable orrery made about 1750 and given to the Academy by Mr. Ralph Shermund; and an exhibit commemorating the 400th anniversary of the birth of Galileo Galilei.



During a brief shutdown in December, the first since its installation in 1952, the Academy-designed planetarium projector was overhauled and adjusted for accuracy, the sky painted to increase brilliancy of the star images, and headrests installed on the chairs for more comfortable viewing of the monthly sky shows. The planetarium's sound system was also improved.

Temporary exhibits were prepared for the Aquarium, for the promotion of *Pacific Discovery* magazine, and for the featured Exhibit of the Month.

The 11th San Francisco Bay Area Science Fair occupied all available space in Simson African Hall from April 4 through April 8, 1964. The San Francisco Aquarium Society's semi-annual Fish Show was held in the North American Hall September 4 through September 8.

The "Nobel Exhibition" was a special exhibit supplied by the government of Sweden and displayed in the Science Museum in December and January.

Sweden was again featured in an exhibit "Technology Now: Swedish Inventions and Other Scientific Advances," which filled Simson African Hall, the Annex, and Lovell White Hall. It included large-scale models of ships and industrial plants, color photographs of Swedish industry, and ten panels illustrating scientific and technological advances together with a brief history of Sweden's contributions.

Bruce A. Kock was appointed Honorary Curator of Horology and has continued his great service of curating the horological collection and exhibits. Mr. Kock was a personal friend and associate of Dr. William Barclay Stevens, who built the enormous collec-

tion of time-keeping devices which he donated to the Academy.

ALEXANDER F. MORRISON PLANETARIUM

Thomas M. Gates, Manager. The Planetarium, which is operated by the Astronomy Department, presented 870 public performances of eleven different shows which were attended by 95,036 adults and 57,206 children. An additional 141 special shows were provided for school class groups and were attended by 45,279.

It is gratifying to note that attendance at the 1963-64 public shows broke all previous records, being 30 percent greater than the previous year. This healthy increase probably resulted from two factors: the excellent shows themselves, and the tremendous general attendance at the Academy.

School class attendance was about the same as that of the preceding two seasons, but somewhat less than that of the 1959 and 1960 years, possibly because several small but excellent instructional planetaria have been built by school districts in various cities in

During the summer of 1964 Laura Fogg and Lon Hall, right, worked for a month with Steinhart Aquarium as part of the Career Exploration Course of the Acalanes Union High School District of Walnut Creek. Below, these sea anemones were brought up alive by skindivers from about fifty feet down in Monterey Bay. The striped fish, the convictfish, is one of the few that is immune to the sting of the anemone. It uses this immunity to advantage by swimming among the tentacles and stealing scraps of the anemone's food.



the Bay Area. It is surprising that only 3898 youngsters, or 8.6 percent of total school attendance, were from San Francisco schools.

Two astronomy courses were given in the fall semester of 1963. One, which consisted of 14 two-hour lectures on astronomy appreciation, was designed to give interested laymen a good background in the principles of astronomy. Michael Grodsky was the course instructor and attendance averaged about 60

persons. The second course was in celestial navigation taught by Maurice R. Amsden. Thirty-eight registered for this series of sixteen two-hour lectures. A modest tuition fee was charged.

STEINHART AQUARIUM

Earl S. Herald, Superintendent and Curator of Aquatic Biology. The Steinhart Aquarium had the largest annual attendance ever experienced by any aquarium. During the year the staff continued to improve the exhibits in the 108 tanks. Eight different water systems provided the best living conditions possible for the 6126 fishes and other aquatic animals, representing 365 species, which were displayed. Among the new and unique exhibits is one in which polarized light makes the internal structure of glassfish visible; another, a tide pool filled with colorful sea anemones into which a wave crashes periodically; an eye-level tide pool tank with a conspicuous fluctuation of water level and accompanying sound effects; and a tank of archerfish which swim contentedly among mangrove roots and "shoot down" their food three times a day by spitting jets of water which knock if off a target.

Improvements were made in the complicated system of five miles of pipes as well as in the pumps, sterilizers, filters, water heaters and coolers, and other instruments and devices which crowd the basement and roof operation areas.

The preparation of an outstanding reptile and amphibian exhibit section continued through the year, with that area nearly ready for opening at the end of this report period. The "swamp area" was made more realistic by the addition of decorative stonework and attractive tropical planting.

The Steinhart Aquarium is indebted to many generous friends for important gifts and improvements during this year. Among them, Marineland of the Pacific gave two additional white-sided dolphins and William Wagner continued to provide beautiful decorative mosaics which enhance the exhibit areas.

While the Aquarium is primarily an exhibit department, various research projects were carried on by the staff. On numerous occasions the facilities were made available to visiting investigators. Dr. Herald, Robert Dempster, who is Assistant Superintendent, and Alan E. Leviton made electrophoresis studies to

determine the protein pattern in the blood of cartilaginous and bony fishes. A high speed cinematographic study of archerfish feeding was conducted by Dempster and Herald. Bacterial analysis of the sterilization effect of ultraviolet light on the water circulating systems was carried out by Herald, Dempster, and Marjorie Hunt, and continuing research on parasites and diseases of fish is conducted by various members of the staff. Dr. Herald continued his studies of the systematics of pipefishes. As an example of the use of the facilities by outside researchers, Leigh W. Mintz and D. Bryan Blake of the Department of Paleontology, University of California, pursued their studies of the effect of environment on the varying morphology of the west coast sand dollar, *Dendraster excentricus*.

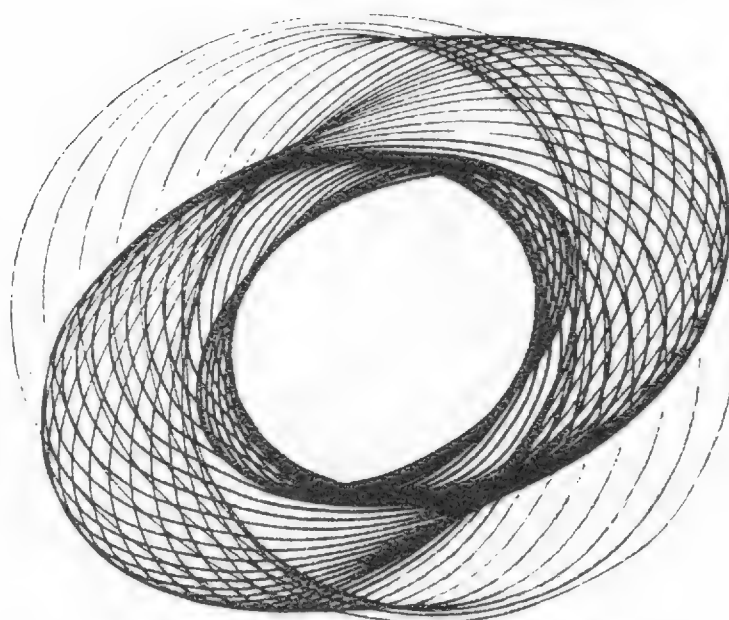
TELEVISION

Daniel J. Norton, Executive Producer. The Television Department was completely reorganized during the year. The 14th year series of "Science In Action" half-hour programs was televised from 13 stations reaching some five million viewers across the United States and in Hawaii. Earl S. Herald continued as Program Host.

This past production season was a period of experiment. Grave problems were experienced with the corporations which held contracts to syndicate the programs and these complicated production activities. Fortunately, an agreement was negotiated with NBC Films, Inc., for future syndication rights. The production experience of the year led to the decision that all future programs would be in color and on film.

"Science in Action" is the oldest and most honored television series on science, and has a very special popularity with viewers. In most viewing areas, science teachers are supplied with study guides which introduce each program to their students. The program is used not only for informative entertainment but also for class work and discussion.

The television program is an extension of the educational activities of the Academy, making possible the description and interpretation of scientific advances and achievements in many areas of investigation. The program provides up-to-the-minute information. Guest scientists, on occasion, have discussed facts and results which have not yet been published.



SCIENCE IN ACTION

"Science in Action" moved forward this year with NBC syndication and the installation of complete production facilities at the Academy. Right, Director David W. Parker and Cinematographer Bill Westcott at work in the new studio. Below, Assistant Film Editor Steve D. Nagy examining film in the editing room.





One hundred years of Academy publications—
Proceedings and Occasional Papers.

J. W. MAILLIARD, JR., LIBRARY

Ray Brian, Librarian. Within the quietly controlled atmosphere of almost any library, there is usually much more activity than meets the visitor's eye. The Academy's Mailliard Library is no exception.

The total library holdings are well in excess of 200,000 pieces, a sizeably impressive collection considering that Mailliard does not attempt to be a general library and specializes in the literature of natural science. The responsibilities assigned the library are far in excess of the personnel available, a situation that has existed for many years but for which there has been no ready remedy. Despite this most difficult situation and mainly through the efforts of a small but hard-working staff augmented by the services of a handful of cheerfully industrious volunteers, 17,740 individual pieces of library material were processed during the period reported. This is an increase of 60 percent over the previous year.

A major occasion in the library and an important activity of the staff was the arrival of the long-awaited Edward E. Hills and Florence Hopkins Hills Collection of Botanical and Ornithological Works, a collection so rich in rare works that this one gift alone is quite sufficient to give the Mailliard Library very greatly enhanced stature in the world of rare books. It includes, among many rarities, an elephant folio of

Audubon's "Birds of America" and four works of Redouté. This splendid gift is housed in the Lucie Haas Stern Rare Book Room, a controlled vault specially constructed for this purpose.

In the field of interlibrary loans, 243 titles were loaned during the year with only two being borrowed from other libraries. This disparity can be taken often as an indication of the maturity of a collection and reflects, certainly, its richness and usefulness.

Shortly following the appointment of Mr. Brian (in mid-1963), Veronica Sexton retired after 33 years of service as librarian and assumed the status of librarian emerita. In September, Mr. Urbain Kinet joined the staff as Library Assistant, temporarily retaining certain teaching responsibilities in the Student Section.

Mr. Anson Herrick, Library Associate, continued his program of binding for the library. During the fiscal year, 41 volumes benefited from his skill with their longevity increased.

Mrs. James I. Campbell continued her generous program of volunteer service as Library Associate in the arrangement of the letters and personal papers of Alice Eastwood, Gustav Eisen, and G. P. Rixford for the archives.

Special acknowledgement should be given to the volunteers mentioned earlier, some of whom served and some of whom continue to serve the purposes of the library in their spare time. They are Lois Block, Suzanne Endow, Lynn Lamoreaux, Barbara Mandler, Julian Arnetz and Ted Jones.

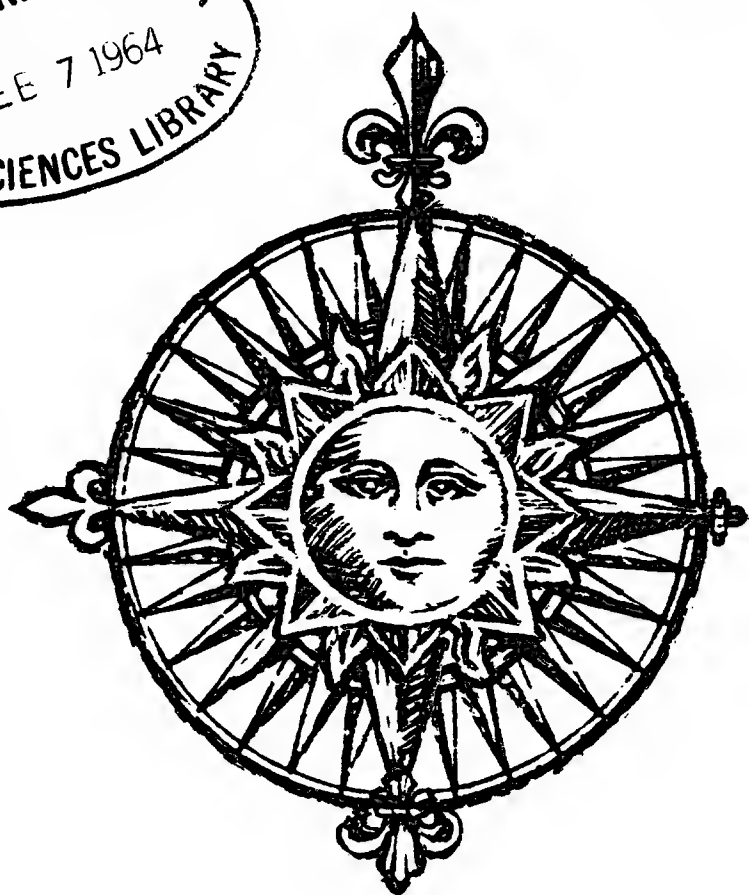
PUBLICATIONS

The dissemination of information is an essential function of a learned society. The fledgling Academy started publishing during its first year and has continued ever since. Research would be useless if the results of that research were not made known to others.

Edward L. Kessel, editor of technical publications, reported that seven *Occasional Papers* and eight numbers of the *Proceedings*, totaling 582 pages, were issued during the year. Several of the *Occasional Papers* were produced entirely at the Academy. They were written, varityped, halftone and color plates made, and printed, all by Academy personnel and with Academy equipment. Dr. and Mrs. G. Dallas Hanna and Glen Hayden were responsible for these.

NOVEMBER
at the
CALIFORNIA ACADEMY OF SCIENCES
PROCEEDINGS
OF THE
CALIFORNIA ACADEMY OF SCIENCES

PACIFIC
DISCOVERY



Return to: PICTURE COLLECTION
CALIFORNIA ACADEMY OF SCIENCES
GOLDEN GATE PARK, SAN FRANCISCO 18

OCCASIONAL PAPERS
OF THE
CALIFORNIA ACADEMY OF SCIENCES

Student
Discovery

Pacific Discovery, the bimonthly journal of nature and man in the Pacific world, was edited by Bruce Finson with art direction by Johan Kooy. The long printers' strike in San Francisco made the production of *Pacific Discovery* particularly difficult, normal deadlines impossible, and printers' errors inevitable. This fine magazine was distributed to all Academy members and to non-member subscribers.

Monthly Academy *Newsletters* were prepared by Hal Richardson, Public Information Officer, to keep the membership informed of meetings and other activities and events. This informal and friendly leaflet introduces the staff to the members, draws attention to a particularly interesting or significant display, or describes an unusual specimen in one of the research collections.

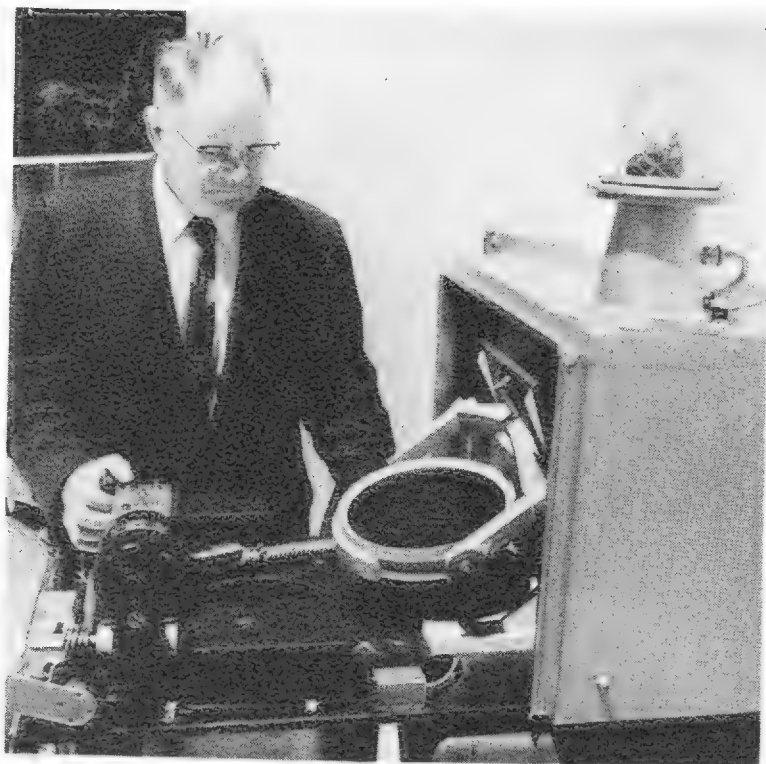
Two additional publications should not be overlooked, both mimeographed products of the Student Section. *Student Discovery* was published monthly from September through June, and three titles appeared in the mimeographed *Student Section Occasional Papers*.

PICTURE COLLECTION

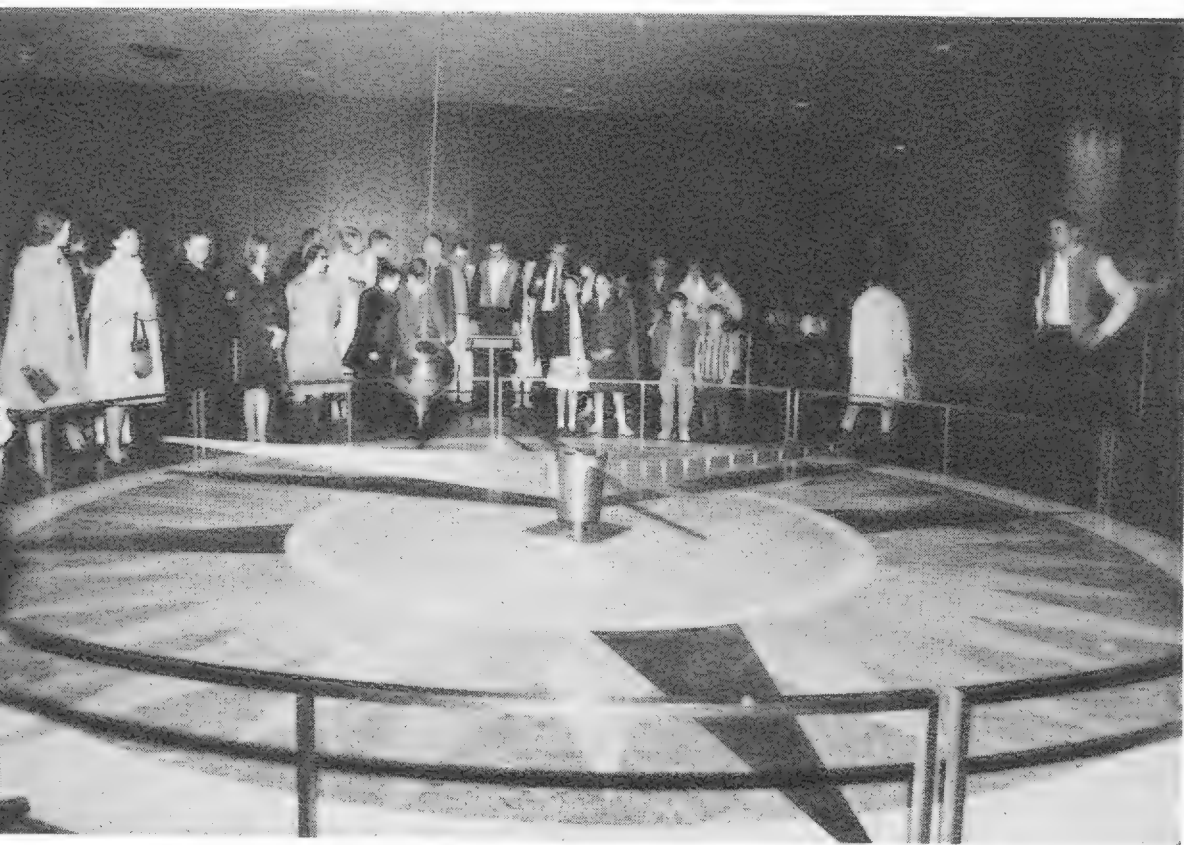
Johan Kooy in charge. During the past year, 3071 photographs, illustrations and transparencies were loaned to agencies and individuals, a positive indication of the increasing value of the Collection. Through the donations of members and friends of the Academy, the Minerva Hirst Reference Picture Collection has grown from 45,000 pictures in 1962 to 160,000 this year. Of great potential use to the Academy are the over 20,000 copyright-free illustrations acquired during the year.

Volunteer assistance has made much of the year's progress possible. Mary Courtright catalogued and filed many of the 28,000 zoological pictures in the Collection. Muriel French has contributed generously of her time to continue the organization of some 13,000 transparencies of western botanical subjects given to the Academy by Charles Webber.

Significant additions have been given during the years to the files of botanical art by Mary V. Roberts and Henry Evans. An important addition was made possible by Rudolph Cesar Bertheau who donated his lifetime collection of pictures in the fields of geography and the natural sciences.



Above, Instrument and Carpenter Shop Superintendent Alvin C. Gundred with the recently-installed heliostat—a telescope that follows the sun and projects an image onto a screen in the Hall of Science. Below, the Academy constructed and installed Foucault pendulums for several other science museums, including this one in the Smithsonian Institution, Washington, D. C.



INSTRUMENT SHOP

Alvin C. Gundred, Superintendent. In many ways, both the Instrument and the Woodworking Shops provide the cartilage for much of the physical plant of the Academy. Through the talent of the craftsmen employed, construction necessary for many departments and activities is created during the year.

During the past twelve months, three Foucault pendulums for institutions as far apart as St. Paul, Minnesota, Tampa, Florida, and Ismir, Turkey, were built under private contract. The Superintendent personally supervised the installation of two instruments at the Smithsonian Institution and at the University of South Florida.

Special projectors needed for the various Morrison Planetarium shows were designed and executed. A

heliostat for reflecting the image of the sun was installed in Astronomy Hall. Countless mechanical devices and lighting fixtures for exhibits within the Academy were made. The Woodworking Shop continued its program of constructing cases and drawers for insect, mammal, botanical, and paleontological specimens for the departments concerned.

One particular activity involved much of the personnel, to wit: clearing and cleaning out the former Academy auditorium in preparation for developing the Hall of Prehistoric Life in North American Hall.

STUDENT SECTION

The guidance and supervision of young people who are interested in science is the special responsibility of the Student Section. Its laboratory facilities and equipment, collections, special library, and instruction stimulate young minds with delicately poised interests. Through past experience we know that a large number of the student members of today will be the scientists, the doctors and the engineers of tomorrow.

During the school year two age groups met every afternoon, Monday through Friday. On Saturday the Junior Section, those from 10 to 14, met in the morning and the Senior Section, 15 years through graduation from High School, in the afternoons. There were frequent field trips on Saturdays and during school vacation periods, some of them extended. In August, 1963, one group explored the Sierra Nevada and Nevada desert for eleven days.

The past year saw the renovation of the Student Section with its laboratories installed in a larger room, freeing the former laboratory for use as a lecture hall.

Student Section enrollment for the year was 164. Mearl F. Carson supervised the program, assisted by Urbain Kinet and Darrel McKenzie. Hiram Li and Jay Hamann instructed during the summer session.

George E. Lindsay

GEORGE E. LINDSAY
Director

STAFF *

George E. Lindsay, *Director*
J. Byron Warner, *Business Manager* • Vashti F. Hawley, *Secretary*
Robert C. Miller, *Senior Scientist*

*As of June 30, 1964

AQUATIC BIOLOGY (STEINHART AQUARIUM)

Earl S. Herald, *Superintendent-Curator*
Robert P. Dempster, *Assistant Superintendent*
David C. Powell, *Assistant Curator*
Glenn E. Burghardt, *Aquatic Biologist*
Karl H. Switak, *Aquatic Biologist (herpetologist)*
Norval J. Green, *Senior Aquarist*
Frederick W. Herms, *Aquarist*
Fred L. Jenne, *Aquarist*
Ken Lucas, *Aquarist*
W. Walter Schneebeil, *Aquatic Collector*
John J. McKenna, *Aquarium Exhibits Preparator*
Donald A. Simpson, *Consultant (part-time)*
Phyllis J. Ensrud, *Secretary*
J. Richard Skahen, *Research Associate*

ASTRONOMY (MORRISON PLANETARIUM)

Mearl F. Carson, *Acting Curator*
Thomas M. Gates, *Planetarium Manager*
Michael Bennett, *Staff Lecturer*
Steven B. Craig, *Technician*
John H. Leonberger, *Technician*
Elizabeth A. Javens, *Secretary*
Maurice R. Amsden, *Lecturer*
Hubert J. Bernhard, *Lecturer*
Charles E. Burleson, *Lecturer*
Charles F. Hagar, *Lecturer*
Jill V. Carson, *Cashier*
Margaret M. Kerwin, *Cashier*
Gloria J. Thompson, *Cashier*
Andrew J. Bernhard, *Usher*
Allwyn Chao, *Usher*
Richard E. Davis, *Usher*
James M. Hansen, *Usher*
Samuel J. Klenk, *Usher*
James J. O'Toole, *Usher*
Cecil E. Webb, *Usher*
Clay P. Butler, *Research Associate*

BOTANY

John Thomas Howell, *Curator*
Elizabeth McClintock, *Associate Curator*
Jane Reese, *Technical Assistant**
Brita Boeckel, *Assistant (part-time)*
Doris A. Cantou, *Assistant (part-time)*
Blanche O. Clear, *Assistant (part-time)*
Virginia Moore, *Assistant (part-time)**
Anita M. Noldeke, *Assistant (part-time)*
Sallie G. Norwall, *Assistant (part-time)*
Mrs. John Hardman, *Research Associate*
Hans Leschke, *Research Associate*
Henry M. Pollard, *Research Associate*
Lewis S. Rose, *Research Associate*

Ernest C. Twisselmann, *Research Associate*

*Temporary position supported by the Bailey Hortorium grant.

ENTOMOLOGY

Edward S. Ross, *Curator*
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Hugh B. Leech, *Associate Curator*
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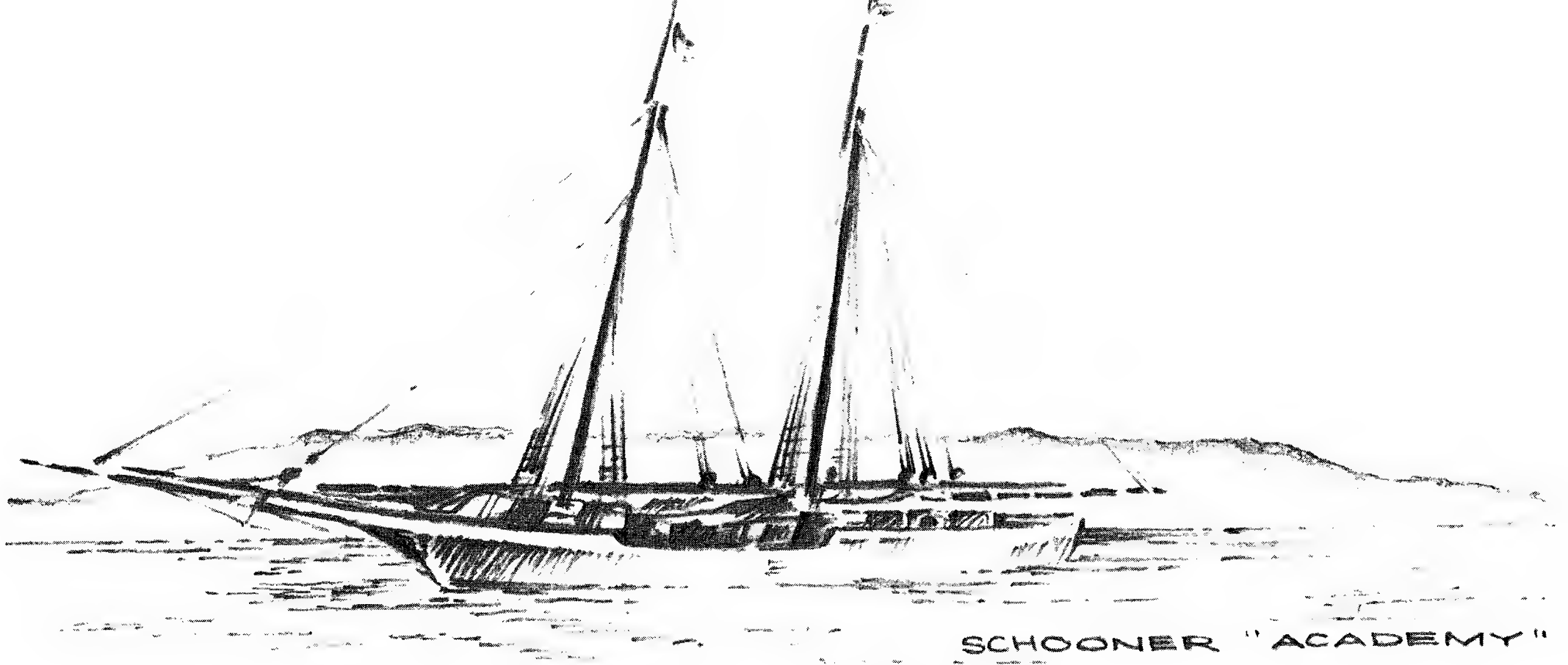


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			GENERAL OPERATING FUNDS		
Cash, demand deposit	\$ 33,865	\$ 29,810	Accrued interest on note payable	\$ 2,683	\$ 2,683
Receivables	82,968	39,399	Due to General Endowment Fund	104,000	—
Book and post card inventories, at cost	9,080	8,287	Fund balances		
Unamortized lease cost (lease expires in 1984)	13,859	14,546	Unrestricted (deficit)	(53,173)	43,664
			Restricted to special contracts	86,262	45,695
Totals	<u>\$ 139,772</u>	<u>\$ 92,042</u>	Totals	<u>\$ 139,772</u>	<u>\$ 92,042</u>
			ENDOWMENT AND SPECIAL PURPOSE FUNDS		
Cash, demand deposit	\$ 81,183	\$ 104,970	Note payable to an insurance company, 5¾%, due October 11, 1964, secured by deed of trust to real property	\$ 210,000	\$ 210,000
Savings account deposits	36,596	35,341			
Due from General Operating Fund	104,000	—			
Investment fund, special purpose					
Securities, at cost (market value 1964—\$398,850, 1963—\$254,477)	325,495	208,266			
Trust savings account	277	55,003			
	<u>325,772</u>	<u>263,269</u>			
Investment fund, endowment					
Securities, at cost (market value 1964—\$1,445,917, 1963—\$716,852)	1,253,663	631,559	Fund balances		
Trust savings account	16,229	129,182	Restricted to plant additions	28,225	41,517
	<u>1,269,892</u>	<u>760,741</u>	Restricted to other special uses		
Rental property (pledged)			Permanent and expendable	424,495	353,332
Cost (less accumulated depreciation \$516,819)	608,083	608,083	Endowment	1,779,906	1,185,655
Real estate under sales option	17,100	18,100			
Totals	<u>\$2,442,626</u>	<u>\$1,790,504</u>	Totals	<u>\$2,442,626</u>	<u>\$1,790,504</u>
			FIXED ASSETS		
Collections, library and equipment, at cost	\$ 934,809	\$ 928,364	Balance of fixed assets	\$ 934,809	\$ 928,364

The accompanying notes to financial statements are an integral part of this statement.

California Academy of Sciences
San Francisco, California

We have examined the fund balance sheets of the California Academy of Sciences, as at June 30, 1964, and the related statement of general operations and statement of changes in fund balances for the year then ended. Our examination was made in accordance with generally accepted auditing standards and accordingly included such tests of the accounting records and such other auditing procedures as we considered necessary in the circumstances, except that it was not practicable to extend the examination of contributions beyond accounting for the receipts as recorded.

In our opinion, the accompanying financial statements present fairly the financial position of the Academy at June 30, 1964 and the results of its operations for the year then ended in conformity with generally accepted accounting principles applied on a basis consistent with that of the preceding year.

L. H. PENNEY & CO.

San Francisco, California
July 30, 1964

CALIFORNIA ACADEMY OF SCIENCES

STATEMENT OF GENERAL OPERATIONS

FOR THE YEARS ENDED JUNE 30, 1964 AND 1963

	<u>1964</u>	<u>1963</u>
INCOME		
General		
Membership dues	\$ 36,483	\$ 30,406
Permanent endowment (Commercial Building rent) . . .	109,304	106,761
Corporate support	42,581	45,920
Gifts, endowments and restricted funds receipts	267,946	166,579
Public operations		
City and County of San Francisco		
Steinhart Aquarium	216,376	215,853
Museum activities	142,035	129,491
Contributory activities		
Planetarium and instrument shop	131,255	93,405
Television (Note 2)	58,616	138,034
Pacific Discovery	10,205	7,501
Sundry sales	76,582	51,641
Other sources	44,551	23,825
Totals	<u>1,135,934</u>	<u>1,009,416</u>
 EXPENDITURES		
Public operations		
Steinhart Aquarium	216,376	215,853
Museum activities	172,519	198,798
Contributory activities		
Planetarium and instrument shop	62,947	49,329
Television	217,904	147,224
Pacific Discovery	36,055	35,393
Cost of sundry sales	81,220	50,610
Scientific research and curatorial activities		
Aquatic biology	33,295	34,920
Botany	27,885	25,065
Entomology	76,553	52,628
Geology	24,216	32,004
Herpetology	16,057	11,828
Ichthyology	10,718	9,344
Invertebrate zoology	23,556	1,997
Ornithology and mammology	9,797	18,094
Library	28,332	25,537
Special research	38,012	35,849
Administrative and general	119,309	60,059
Contributions to employees' pension annuity	25,945	—
Interest	12,075	12,075
Totals	<u>1,232,771</u>	<u>1,016,607</u>
 EXCESS OF EXPENDITURES OVER INCOME	<u><u>\$ 96,837</u></u>	<u><u>\$ 7,191</u></u>

CALIFORNIA ACADEMY OF SCIENCES
STATEMENT OF CHANGES IN FUND BALANCES FOR THE YEAR ENDED JUNE 30, 1964

	General fund		Endowment and special purpose funds			
	Unrestricted	Special contracts	Plant additions	Special uses	Endowment	Fixed assets
Balance, June 30, 1963	\$ 43,664	\$ 45,695	\$ 41,517	\$353,332	\$1,185,655	\$928,364
Additions (deductions)						
Gifts and grants received			2,895	103,450	646,346	
Income from investments			788	11,487	37,983	
Net gain on sale of securities					8,905	
Other receipts				3,857		
Additions to library						6,445
Expenditures for special purposes			(16,975)	(33,211)	(2,352)	
Appropriations of funds to general income						
Special purpose funds				(14,420)		
Endowment funds					(35,631)	
Funding pension fund					(21,000)	
General working capital					(40,000)	
Excess of operating expenditures over income and appropriations . . .	(96,837)					
Excess of special contract research income over expenditures and overhead		40,567				
Net additions (deductions)	(96,837)	40,567	(13,292)	71,163	594,251	6,445
Balance (deficit), June 30, 1964	<u>(\$53,173)</u>	<u>\$ 86,262</u>	<u>\$ 28,225</u>	<u>\$424,495</u>	<u>\$1,779,906</u>	<u>\$934,809</u>

The accompanying notes to financial statements are an integral part of this statement.

CALIFORNIA ACADEMY OF SCIENCES
NOTES TO FINANCIAL STATEMENTS

1. Buildings located in Golden Gate Park carried at \$2,354,362 are not included in fixed assets as title to buildings is vested in the City and County of San Francisco.
2. Various films produced during the period for the television program, Science In Action, have been subsequently sold for foreign viewing for royalty fees to date totaling approximately \$52,500.

The Academy is bringing suit against certain parties for monies due on the sales and servicing of syndicated television programs in the principal sum of \$60,485.

These items are not reflected in the financial statements.

Form of Bequest

I give and bequeath to The California Academy of Sciences in the City of San Francisco, the sum of

for such uses and purposes as the Trustees of said Academy may determine.

Signature

Please read the reverse side.

Have You Been Meaning To?

Many friends of the Academy tell us, "I'VE BEEN MEANING TO leave the Academy some money in my will, but I haven't got around to it." Well, if you've BEEN MEANING TO, just fill out the reverse side of this slip and send it to your lawyer.

A bequest to the California Academy of Science's Endowment Fund puts you on record as a friend and supporter of science, research, and public education. These are the most important factors in the country's future progress.

Support them through a bequest to the Academy... fill out the reverse side of this slip and send it to your lawyer.

ABOUT MEMBERSHIP

OUR MEMBERS are the backbone of the Academy. Their dues and contributions go to support the scientific research which is the lifeblood of the Academy, and which causes it to be well known all over the world. Our members, too, provide a friendly public opinion when civic matters affecting the Academy come to the fore. They are true patrons of science, democratic replacements for the rich nobles of former days, and they should obtain great satisfaction from supporting this scientific work.

The number of our members has not kept pace with the growth of the population. We would like to ask each of our members to use the enclosed membership blank in this report to enlist a friend as a member. In addition to the satisfaction of being a patron of scientific research, a member receives a free subscription to our illustrated magazine, *Pacific Discovery*, tickets to the Morrison Planetarium, a monthly meeting in the Auditorium at which interesting movies and travel or nature talks are given, a monthly Newsletter, use of the library, and a 10 per cent discount on purchases at our sales desks which are crammed with unusual gifts and books. Use that membership form now and enlist a friend.

ABOUT BEQUESTS

DURING THE year the Academy received some substantial and most welcome bequests. They enabled the Academy to install a sorely needed benefit; namely, a pension scheme for Academy employees. Without these bequests it would have been out of our financial reach to establish a pension scheme, which nowadays is a necessity in attracting workers to our staff.

The balance of the money received by bequest was placed in the Endowment Fund. The Endowment Fund constitutes the Academy's fixed capital. These moneys are invested prudently by the Trustees, and only the income from the investments is used for salaries and general operations.

It is our long term aim to build up this Endowment Fund to a point where the income from it will take care of most of our scientific work. All members are urged to include in their wills a bequest, however small, to the Academy.

A form is inserted in this report for this purpose.



